NASA Glenn Research Center
AEROSPACE Frontiers
Volume 6 Issue 7 July 2004

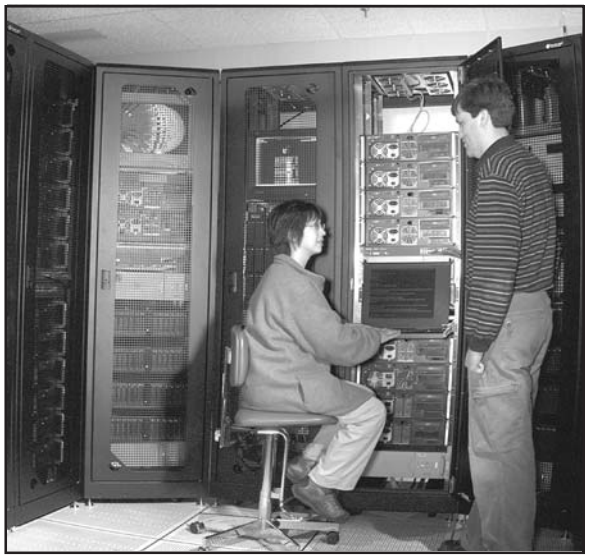
Glenn repeats revolutionary award performance

Glenn repeated last year's outstanding performance by garnering six Turning Goals Into Reality awards for technologies to enable revolutionary capabilities in aeronautics, space transportation, and scientific exploration. The awards, sponsored by the NASA Office of Aerospace Technology (OAT), will be presented during a July 14 ceremony in Washington, DC.

Research on the following award-winning technologies was managed at Glenn, with participation from other NASA centers, industry, and academia. An overview of the technology is listed under strategic themes and objectives.

Aeronautics Technology—Aviation Safety: *Jet Engine Containment Concepts and Blade-Out Simulation Team*
One of the most complex, challenging, and risky component design and certification requirement for commercial jet engines is the "blade-out" rotor failure, which can result in catastrophic losses. A Glenn-led team of industry, university, and Federal Aviation Administration (FAA) researchers developed breakthrough technology to improve

Continued on page 2



C-2004-791 Photo by Quentin Schwin

The Advanced Computational Concepts Laboratory (ACCL) 128 node distributed cluster provided the computational power for the Ground-Truthing experiments. ACCL built the Information Power Grid computational resource to provide near super-computing performance at a fraction of the price of traditional super computers. Pictured are Fran Lawas-Grodek (7160) and Isaac Lopez (0300/2900).

Scales named director of Operations

Charles Scales, who previously served as director of the Equal Opportunity Office at NASA Marshall, has been named director of Glenn's newly formed Center Operations Directorate, Code C.

As head of the directorate, Scales oversees the Office of Human Resources and Workforce Planning, the Security Management and Safeguards Office, the Logistics and Technical Information Division, and the Procurement Division.

Scales

"It is an honor to join the dedicated team of professionals in Center Operations as we support Glenn in continuing its long tradition of expanding horizons and opening frontiers," Scales said.

Scales began his NASA career in 1973 as a cooperative education student at Marshall. Since then he has held a variety of management positions, including chief, Program Controls Facilities Office; chief, Resources Management Branch, Information Systems Office; director, Plans and Analysis Office; and director, Business Management Office, Institutional and Program Support Directorate.

Recognized for his outstanding leadership in the workplace and community, Scales has earned numerous honors and awards, including NASA's Exceptional Service Medal, Space Flight Leadership, and Silver Snoopy. ◆

Inside

Glenn merits six TGIR awards

Continued from page 1

prediction rates for complex engine-airframe structural systems dynamics and major improvement in fan blade containment capacity. Prediction of engine blade-out has been improved by 50 percent with a design cycle time reduction of 25 percent, a 30-percent improvement in fan blade containment capacity, and 50-percent containment system weight reduction.

Aeronautics Technology—Protect the Environment: *Coated Ceramic Matrix Composite Components Team*
The future of gas turbine engines lies in successfully introducing high-temperature, lightweight components that require little or no cooling to improve performance. A new ceramic matrix composite (CMC) system developed under NASA's Ultra-Efficient Engine Technology Program demonstrated a 500° F increase in thermal capability of gas turbine hot sections over current superalloy and metallic components, enabling significant reduction in emissions and fuel savings.

Space Launch Initiative—Mission Safety and Reliability: *Cooled Ceramic Matrix Composite Propulsion Structures Team*
Under NASA's Next Generation Launch Technology Program, development of actively cooled carbon and CMC structures led to demonstration of the world's largest (6 X 30 inches) cooled nonmetallic com- posite panel for a scramjet engine test. Lightweight, high-temperature, actively cooled structures are a key technology to low cost access to space. Projected weight savings from utilizing CMC structures in hypersonic systems is upwards of 50 percent, which translates into increased payload and/or range capability.

Mission and Science Measurement Technology—Science and Engineering-Driven Architectures and Technology: *Ground Truthing Team*
NASA's capacity to extend powerful computing resources to remote locations will greatly impact the future of space exploration. Glenn scientists designed, performed, and analyzed a "ground truthing" experiment to demonstrate a new data verification method. The new method analyzes and reduces in real time a combination of satellite imagery and ground measurements using distributed computing resources to aid decisionmaking of robots or astronauts during planetary missions.

Innovative Technology Transfer Partnership—Extending Benefits to Society: *Hybrid Ice Protection System Team*
The collaborative effort of a Government and industry team to create a new form of aircraft icing protection resulted in the first deicing system to be FAA-certified in over 40 years. The hybrid system makes optimal use of the lower levels of power available from modern high efficiency engines. The system requires only one-quarter of the power that an evaporative electrothermal system uses by combining a thermal anti-icing system with a mechanical deicing system. An *R&D 100* award winner in 2003, this system is now manufactured by Cox & Company, Inc., New York, NY. It is in production for use on the horizontal tail of Raytheon Aircraft's new Premier I business jet.

Enterprise Education and Outreach—Inspire Students, Engage Public: *NASA Glenn Education and Outreach Initiatives Team*
Several Glenn organizations have made innovative use of their means by pooling their resources together. Glenn's Education and Outreach Initiatives Team (Educational Programs Office, Learning Technologies Project, and Ultra-Efficient Engine Technology Project) has participated in a bevy of national and international events, sustained successful external partnerships, and created a broad repertoire of high-quality educational and outreach products to inspire and motivate students to pursue careers in science, technology, engineering, and mathematics. ◆

Apollo mission celebrates 35th; Cassini to reach Saturn

As the 35th anniversary of the Apollo 11 mission approaches and the Cassini mission nears its destination, Glenn (Lewis) scientists, engineers, and technicians are reflecting with pride on their support of these missions. This Center's contributions to Apollo are prominently recorded in NASA history. Former Center Director Dr. Abe Silverstein named the program and chaired the committee to determine the launch vehicles that would be used. Not least, Apollo 11 Commander Neil Armstrong, the first human to land and step onto the surface of the Moon, began his NACA and NASA career here.

The Center's pioneering research in liquid hydrogen and oxygen rocket fuels under Silverstein's leadership was applied to Saturn rockets used to launch Apollo missions and the development of RL-10 engines, which powered the upper stage of the famous Centaur.

Many years later, on October 15, 1997, the heaviest and most complex spacecraft ever to be launched on an interplanetary mission was set on course by a Titan IV-Centaur launch vehicle.

Continued on page 11

Glenn garners six more Space Act Awards

Six Glenn-developed technologies were selected to receive 2004 NASA Space Act Awards by the NASA Inventions and Contributions Board (ICB). Space Act Awards are monetary awards for outstanding scientific or technical contributions sponsored, adopted, supported, or used by NASA that are significant to aeronautics and space activities.

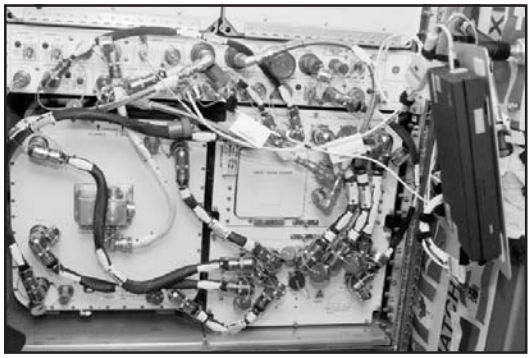
Individual scientists, engineers, and contractors at NASA can receive a personal award up to $100,000 based on the value of the invention in terms of savings to the government. The ICB also honors contributors with initial awards for innovations reported in *NASA Tech Briefs*, software released by NASA to qualified users, or a NASA-approved patent application.

DMBZ–15 is a new thermosetting polyimide resin developed to extend the high temperature capability of aircraft engine components such as bushings, missiles, propulsion systems and air frame structures in space transportation. DMBZ15 was jointly developed by Glenn's Dr. Chun-Hua (Kathy) Chuang (5150) and Ray Vannucci (retired), with Dr. Robert Gray and Eric Collins of Maverick Corporation of Blue Ash, OH.

The fault-tolerant, high-temperature, high-load **radial magnetic bearing** that incorporates such innovative features as a modular C-core stator construction, optimized rotor/lamination assembly, and new coil winding capable of withstanding a static 1000-lb force at 25,000 rpm or while operating in a fault-tolerant mode at 1000°F has been parlayed into two new patents. The award-winning technology was developed by a Structures and Acoustics Division team including Andrew Provenza, the Army Office's Gerald Montague and Albert Kascak; the University of Toledo's Mark Jansen, and Ralph Jansen; NASA retiree Ben Ebihara; and Texas A&M University's Dr. Alan Palazzolo.

Lithium batteries have the highest power density of any commercially available battery, but are expensive to produce because of their complex assembly and the liquid electrolyte technology. Glenn scientists Dr. Mary Ann Meador and Dr. James Kinder, Materials Division, developed a new **rod-coiled block polymer** that combines mechanical strength needed to keep the anode and cathode separate with ionic conductivity, an order of magnitude better then the state-of-the-art polymer electrolyte, all in one flexible film. Use of this new polymer could simplify construction and consequently reduce the cost of lithium batteries, while enabling thinner, more flexible designs.

Dr. Mark McDowell, right, is pictured with his SIV technology, which fits into a cabinet for easy access. The PCS experiment, as integrated on ISS, is pictured below.



The **Physics of Colloids in Space** (PCS) is a rack-based microgravity experiment for EXPRESS (Expedite the Processing of Experiments to Space Station) that was performed on the International Space Station (ISS) from June 2001 to February 2002. The PCS experiment gathered data on the physical properties of colloids—very small particles about one-hundredth the thickness of a human hair—suspended in a liquid or gas. Its significance lies in discovering the collective phase behavior of complex fluids and adding to the body of knowledge to engineer new structures that have potential uses in drug delivery, packaging, encapsulation, and fluids and solids control, as well as establishing a reusable ISS payload platform and system for colloidal and other complex fluids research for the near future. The PCS was developed and operated by a Microgravity Science Division team including Michael Doherty and Amy Jankovsky; Zin Technologies' Tibor Lorik, Jeff Eggers, John Bowen, William Shiley, Carol Kurta, Kevin Dendorfer, and Michael Dobbs; and Subramanian Sankaran, National Center for Microgravity Research.

Stereo Imaging Velocimetry (SIV) is a three dimensional, full-field quantitative, and qualitative analysis tool consisting of two cameras oriented at 90°, with respect to each other, to track the motion of small tracer particles that have been seeded in a transparent liquid. SIV was used on three different shuttle experiments to track biological cells, to identify and track bubble nucleation and migration, and to determine the interface shape of a typical colloid. Industrial applications include vacuum cleaner flow analysis, surface characterization, and in-line process inspection. SIV was invented by Dr. Mark McDowell, Microgravity Division, who currently holds two patents for SIV technology.

ESCORT-D is a monitoring and recording system designed and developed to support experiments tested in Glenn's Lewis Field and Plum Brook test facilities. ESCORT-D is the innovation of a group of current and since retired employees from Office of the Chief Information Officer including Bill Belter, Terrence Flowers, Joseph Rossoll, Dennis Kay, Gayle Roth, Jerri Vokac, with retirees Robert Kannenberg, Sue Button, Leslie Kee, Walter Ponezacs, Robert Setter, and June Thompson (GSP).

Three of these recent Space Act Awards have also been recognized for other prestigious honors. DMBZ–15 and radial magnetic bearings earned an *R&D 100* award while the SIV earned a nomination for the 2004 NASA Government Invention of the Year.

Glenn innovators interested in applying for a Space Act Award should complete NASA Form 1329 and submit it to Laurel Stauber, Technology Transfer and Partnership Office. ◆

Ask the Director

Q: Has NASA considered implementing 360-degree-feedback for supervisors in management positions? This is a survey that allows employees to evaluate their direct supervisors. The supervisors have access to their survey results and can use their subordinates' anonymous comments, ratings, and ideas to improve the way they manage people.

A. (Posted 6/1/04) Thank you for your question suggesting NASA implement 360-degree-feedback for supervisor and management positions. As a result of the findings of the Columbia Accident Investigation Board (CAIB) and the Safety and Mission Success (SMS) week feedback from across the Agency, the Administrator engaged Behavioral Science Technology, Inc., a safety consulting firm, to help effect a cultural change concerning NASA's leadership and management behavior. Specific focus is being placed on engendering a fear-free environment for employees to openly communicate safety issues, and on improving managers demonstration of leadership and support of the workforce. As part of the overall cultural change effort, BST is facilitating 360 degree-feedback input for the Agency's leaders and managers. The process is beginning with the Administrator, the Deputy Administrator, and the Associate Administrators being the first to undergo a 360-degree evaluation, and subsequently be professionally coached to achieve improvements based on the inputs to their evaluation. Here at GRC, within the next 2 weeks, 12 organizational leaders and project managers, including myself, will be the first to participate in the 360-degree-feedback and coaching initiative. Also, initially participating will be the Deputy and Associate Director, six directors of, and three project managers. As the process evolves over the summer, all the Center's supervisors and managers will be participating in the 360-degree-feedback program, as you suggested. ◆

The above question was chosen by the Director as a sampling from the Ask the Director *Web site. The entire column from the Ask the Director Web site can be viewed under Corporate Focus on Glenn's internal homepage (WING).*

Exchange Corner

• Don't forget before summer is over to stop by the Exchange Store to purchase Cedar Point Amusement Park tickets for the 2004 season.

• Stay tuned to *Today@Glenn* for details on summer specials at the Exchange Store and cafeterias.

News Notes

LESA MEETING: LESA/IFPTE, Local 28, will hold its next monthly membership meeting on Wednesday, July 14, at noon in the Employee Center, room 101.

MAMMOGRAPHY 2004: The 2004 Corporate Mammography Program is being offered at the following locations and dates: (1) Women's Diagnostic Clinic on Lorain Ave. Registration is from July 1 to December 31. Screening is also from July 1 to December 31. Fee is $90. (2) Women's Diagnostic Center at Severance Center. Registration is from August 1 to December 31. Screening is from October 1 to December 31. Fee is $85. (3) Cleveland Clinic at satellite locations. (ALL participants through the Cleveland Clinic MUST have a prescription order from their primary care physician for a mammogram screening. This applies to the Cleveland Clinic only!) Dates for registration, from July 1 to October 1, and screening from October 1 to December 31, will not be extended. Fee is $125. Computer-aided detection interpretation is an additional $31, to be paid by the participant.

SATURDAY VISITOR CENTER EVENT: Glenn's Visitor Center July 17 special event will feature two presentations in the auditorium. At 11 a.m., Geologist Mike Blair will present "Lord of The Rings," a talk about the composition of Saturn and its rings. At 1 p.m. Blair will present "Amazing Saturn," which focuses on the Cassini mission. Registration for both programs is required by calling 216–433–9653. This event will also feature hands-on children's activities and free photo souvenirs.

DOCUMENTARY PREMIER: The Plum Brook Reactor documentary premier will be Wednesday, July 14, from 7 to 9 p.m. at the Sandusky State Theatre, 107 Columbus Ave., Sandusky,OH. FREE.

R&T REPORT: The 2003 "Research & Technology (R&T) Report" selectively summarizes Glenn's research and technology accomplishments. It is now available in hard copy and on-line at http://www. grc.nasa.gov/WWW/RT/.

Savings Bond Drive Kickoff

Mark your calendar for August 13 to attend Glenn's Savings Bond Drive Kickoff in the Administration Building Auditorium. This annual event offers food, fun, and prizes!

Journey to Tomorrow

A 4-day discovery mission at NASA Glenn

Over 35,000 visitors of all ages came for a glimpse of what lies behind the gates of NASA Glenn during an open house, held June 12 and 13 as part of the Journey to Tomorrow celebration. Enthusiastic Glenn staff guided the public through world-class facilities, and "wowed 'em" with the technologies behind some of the Nation's greatest innovations. More than 600 Glenn employees and their families came to NASA Night at Jacobs Field on June 10 to root for the Cleveland Indians after Administrator Sean O'Keefe tossed the ceremonial first pitch. On June 14, the Technology Showcase explored opportunities to build relationships and contracting partnerships among 430 registered attendees from business, industry, and academia.

"Words cannot adequately express my pride in being part of the NASA Glenn team. Journey to Tomorrow was exactly what we needed to share our work and accomplishments with the public and to reaffirm who we are and where we are going as a Center," said Center Director Dr. Julian Earls. "The reactions and comments from the visitors were inspirational. I thank all who worked so hard to achieve our goals. You bring a new dimension to one of our values, 'our NASA Family.'"

C-2004-788

C-2004-748

C-2004-766

(1) A young visitor shakes hands with a virtual astronaut. **(2)** NASA Administrator Sean O'Keefe throws out the first pitch at Jacobs Field at the game between the Cleveland Indians and the Florida Marlins. Prior to the game, the Community Support Committee, who raised $100,000 in cash and in-kind services for Journey to Tomorrow, hosted a dinner for O'Keefe and local dignitaries at the Terrace Club. **(3)** Larry Oberle (5520) describes optical diagnostic technology to a Technology Showcase attendee. **(4)** The NASA Jam Band, comprising past and current employees, provided musical entertainment on Sunday. **(5)** Thousands stopped by the Visitor Center to enjoy exhibits and speakers.

C-2004-759

C-2004-789

C-2004-747

(1) Center Director Dr. Julian Earls and the Cleveland Indians' mascot, Slider, enjoy NASA Night at Jacobs Field. **(2)** Matthew Smith (5960) utilizes the Water Bearing Rig to teach visitors about oil-free turbomachinery. **(3)** Aviation enthusiasts get an upclose look at Glenn's S-3 Viking (pictured), Learjet 25, and Twin Otter; NASA Johnson's T-38 (which was flown in by Astronaut Mike Foreman); and the EGC/Northcoast Baron 789 CB, a flight test aircraft with the thermawing de-ice system developed under the Glenn Small Business Innovation Research Program. **(4)** Lisa VanDerAar (7140) explains embedded Web technology. **(5)** Displays and interactive booths in Glenn's Hangar, one of six facilities open to the public, highlights the Center's diverse technology. **(6)** Crowds of all ages view a robotics demonstration at the FIRST (For Inspiration and Recognition of Science and Technology) Program display.

C-2004-790

C-2004-762

"Journey to Tomorrow was truly a team effort. Glenn employees went above and beyond the call of duty to make this event informative and fun!"—David DeFelice, Journey to Tomorrow project manager

"I signed up for the Technology Showcase. . . but I brought my daughter, Sarah, to the open house for her to see more of what NASA is all about." —Frank Popiel, Columbia Station

C-2004-779

"I can't believe this is free!" —John Cranston, Cleveland

C-2004-785

C-2004-784

Photos by Marvin Smith, Quentin Schwinn, Tim Dedula, and Doreen Zudell

C-2004-758

C-2004-756

"We're amazed at the amount of products that filter to the public as a result of important work done at NASA." —George and Robin Gardner, Bryan

C-2004-757

C-2004-755

(1) Deputy Director Rich Christiansen, right, and Rick Gilmore (IDI/9200) discuss Glenn's research and mission during one of six live NASA TV broadcasts and Web casts in the Visitor Center. **(2)** Nancy Rabel Hall (6712) replays a drop using the wireless Microgravity Demonstrator while **(3)** a crowd of visitors gather in the Zero-Gravity Research Facility. **(4)** Roger Chamberlin (7620) briefs visitors on research performed in the Propulsion Systems Laboratory.

(5) Eric McFarland (5810) helps guests build pop rockets. **(6)** A coloring activity enables children to demonstrate their creativity. **(7)** Astronaut Donald Thomas, a Cleveland Heights native, shares his experiences in space and signs autographs in the Visitor Center. (Astronaut Mike Foreman also attended the open house and signed autographs.) **(8)** Tim Dedula (9200) helps future flyers recreate the Wright Brothers first flight in this replica of the hip cradle used by the Wright Brothers' to control the first airplane.

"We were impressed with the activities for children. . . things they could really get their hands on."—The Amantea Family, Brook Park

"I haven't been back since I was a Cub Scout and now I'm 41. It's been great." —Dale Kostura, Valley View

C-2004-751

C-2004-752

C-2004-760

More than 400 leaders and technologists from businesses of all sizes, administrators and researchers from academia, and entrepreneurs attended Glenn's Technology Showcase. Rescheduled from Friday, June 11, to Monday, June 14, in respectful observance of President Ronald Reagan's funeral, the event showcased NASA Glenn technology and partnering opportunities. One hundred employees staffed the event.

C-2004-765

"The overwhelming response of the attendees I spoke to was positive. They were glad they had attended the event, and they said they had learned a great deal."—Kathy Needham, co-program chair, Technology Showcase

C-2004-767

"I'm looking forward to future events."—J. Collura, John Carroll University

C-2004-763

C-2004-769

"I learned something in the Third Frontier breakout that was a real eye-opener and worth the 'price of admission,'"—Carol Cash, GE Aircraft Engines

C-2004-770

(1) NASA Administrator Sean O'Keefe (via satellite) joins Center Director Dr. Julian Earls, standing, in welcoming participants to the Technology Showcase. Seated, left to right, are Colonel Michael Heil, director, Air Force Research; State Senator Robert Spada; and John Hairston, director, Glenn's External Programs Directorate. (2) Lindsey Flash (7180) explains the Regenerative Fuel Cell and LabVIEW demonstration. (3) One-on-one sessions link Glenn scientists and engineers with participants. (4) Patrick Valente, deputy director, Technology Division, Ohio Department of Development, provides an update on Ohio's Third Frontier Program during a breakout session. (5) Henry Speier (7420) explains thruster technology in the Electric Propulsion Laboratory. (6) Astronaut Carl Walz, manager of NASA's Multi-Mission Nuclear Power and Propulsion Technology, shares an overview of Project Prometheus.

"It was encouraging to see that 'entrepreneurship' is alive and well in Ohio and that NASA Glenn is helping support it."—Paul Fisher, C³

C-2004-768

Vision supported

Senators in Ohio's 125th General Assembly passed unanimously a concurrent resolution encouraging the U.S. Congress to support and fully fund NASA's Vision for Space Exploration Program. State Senator Robert F. Spada from the 24th District, along with State Representative Thomas Patton of the 18th District, sponsored the resolution and invited NASA Glenn to Columbus, Ohio's Capitol, to offer proponent testimony about its role in expanding America's exploration boundaries from the 13 original states to the lunar surface. They also praised Glenn for igniting the interest of American students in science, technology, engineering, and mathematics. Director of External Programs John Hairston provided expert testimony.

CONCURRENT RESOLUTION

To encourage the United States and Congress to support and fully fund the National Aeronautics and Space Administration's Vision for Space Exploration Program.

Centaur celebrated

C-2004-794

Photo by Quentin Schwinn

Current and former Center employees who worked on the Centaur filled the DEB Auditorium on June 9 for a special ceremony celebrating the release of the book *Taming Liquid Hydrogen: the Centaur Upper Stage Rocket 1958—2002*. Locally authored by Dr. Virginia Dawson and Dr. Mark Bowles, this history publication focuses on the technical and political hurdles that Centaur faced over the three decades that it was managed by NASA Glenn (Lewis). In welcoming remarks, Center Director Dr. Julian Earls applauded the employees for their outstanding teamwork while former Center Director Andy Stofan highlighted some of the talented people and milestones achieved during his 16 years on the Centaur project. Dawson and Bowles acknowledged the dozens of interviewees and others who helped shape the book before graciously accepting the American Institute of Aeronautics and Astronautics (AIAA) 2004 History Manuscript Award presented by AIAA's Dr. John Blanton, Region III director, and Christopher Pestak, deputy director. Pictured, seated, is Bowles and Dawson at the book signing.

Safety and Mission Assurance interchange

Administrator Sean O'Keefe joined a distinguished group of speakers, including Bryan O'Connor, associate administrator, Code Q, during the Seventh Annual Assurance Technology Symposium from June 8 to 11, at OAI. Major Gen. John L. Berry, vice president of SAP Labs, Inc., and executive director of the Columbia Accident Investigation Board, provided the keynote address. Hosted by Glenn and sponsored by the NASA Office of Safety and Mission Assurance (SMA), the symposium provided a forum for technical interchange between SMA personnel and other interested project personnel. Participants shared ideas, best practices, and lessons learned regarding technical advances in safety and assurance technologies, and showcased technical excellence in the field among the NASA centers.

Photo by Traci Morris

Stepping out

On May 19th, 140 Glenn employees participated in the annual Step Out sponsored by Singleton Health Services. This event, in honor of National Employee Health and Fitness Day, features a 1.4-mile walk, door prizes, and blood pressure screenings.

C-2004-746

Photo by Quentin Schwinn

People


Dr. Baaklini


Dr. Blankson


Dunlap


Dr. Gyekenyesi

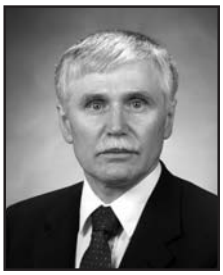

Mate


Dr. Melis


Dr. Okojie


Dr. Sawicki

Awards and Honors


Dr. Schneider


Steinetz

Dr. George Baaklini, Dr. Jerry Sawicki (CSU) and **Dr. Andrew Gyekenyesi** (OAI) of the Optical Instrumentation Technology Branch received a Best Paper Award from the International Society for Optical Engineering at the 9th International Symposium on Nondestructive Evaluation for Health Monitoring and Diagnostics. Their paper, entitled "Vibration-Based Crack Diagnosis in Rotating Shafts During Acceleration Through Resonance," focused on the development of a nonlinear rotor-dynamics model that will be used in conjunction with vibration data for in situ health monitoring of commercial aviation propulsion systems.

Jane Odom, NASA Headquarters archivist, presented a Certificate of Appreciation to **Robert Mate**, a Glenn History Office intern from Marquette University, for research he conducted to identify all of the Agency's historic landmarks. Due to Mate's efforts, all NASA facilities previously designated landmarks will finally receive a plaque to prominently display its identification. Mate's final report is serving as a roadmap for collecting the histories on these landmarks.

Dr. Matt Melis, Structures and Acoustics Division, recently received the Space Shuttle Program Star Award for his contributions as team lead for Glenn's Ballistic Impact effort supporting the Columbia Accident Investigation and Return to Flight. Melis was one of 12 selected from a group of 68 nominees for this significant award.

Patents

Dr. Isaiah Blankson and **Dr. Steven Schneider**, Research and Technology Directorate, were issued U.S. patent 6,696,774-B1, entitled "Magnetohydrodyamic Power Extraction and Flow Conditioning in a Gas Flow Turbine." This invention provides a system for conditioning flow in a gas flow turbine or turbojet and for achieving power extraction to increase relative velocity and efficiency of the engine.

Bruce Steinetz and **Patrick Dunlap,** Mechanical Components Branch, were issued U.S. patent 6,702,300, entitled "High Temperature Seal for Large Structural Movements." This invention was originally conceived of as a high-temperature seal that could accommodate large deflections between adjacent linear aerospike engine ramps on the X–33 vehicle. The seals prevent hot gases from getting behind the ramps and into backside cavities.

Dr. Robert Okojie, Sensors and Electronics Technology Branch, was issued U.S. patent 6,706,549, entitled "Multifunctional Microelectromechanical Devices and Method of Bulk Manufacturing Same." This patent describes a method for the simultaneous fabrication of silicon carbide (SiC) micro-electro-mechanical devices that offers a multiuser platform for bulk micromachining of three-dimensional structures. Individual SiC pressure sensors, accelerometers, and flow sensors can be simultaneously fabricated on a single SiC wafer by allocating diespace, which lowers production costs by eliminating the need for individual users to possess and maintain fabrication facilities to produce devices that have inherently low volume demand.

AeroSpace Frontiers is an official publication of Glenn Research Center, National Aeronautics and Space Administration. It is published the first Friday of each month by the Community and Media Relations Office in the interest of the Glenn workforce, retirees, Government officials, business leaders, and the general public. Its circulation is approximately 6700.

Editor.....**Doreen B. Zudell**
InDyne, Inc.
Assistant Editor.....**S. Jenise Veris**
InDyne, Inc.
Managing Editor.....**Lori J. Rachul**

DEADLINES: News items and brief announcements for publication in the August issue must be received by noon, July 16. The deadline for the September issue is noon August 13. Submit contributions to the editor via e-mail, doreen.zudell@grc.nasa.gov, fax 216–433–8143, phone 216–433–5317 or 216–433–2888, or MS 3–11. Ideas for news stories are welcome but will be published as space allows. View us online at http://AeroSpaceFrontiers.grc.nasa.gov.

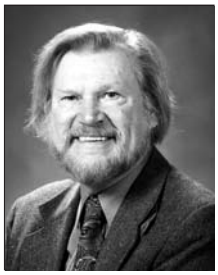
WINNER 2003 APEX® AWARDS FOR PUBLICATION EXCELLENCE

Retirements

John Dunning, Jr., retired on May 31, 2004, with 37 years of NASA service.

Robert Smalley, Research Testing Division, retired on May 31, 2004, with 39 years of NASA service.

Dunning



Smalley

Shirley Joseph, Safety and Assurance Directorate, retired on June 3, 2004, with 26 years of NASA service.

Karen Wester, Power and On-Board Propulsion Division, retired on June 3, 2004, with 42 years of NASA service.

Apollo 11; Cassini

Continued from page 2

The Glenn launch team managed Cassini's launch and monitored its flight through Centaur separation. The mission, a collaboration of NASA, the European Space Agency (ESA), and the Italian Space Agency, includes the ESA-built Huygens probe and 12 scientific experiments.

Cassini is scheduled to reach Saturn this month and begin a 4-year orbit of the planet, after deploying the Huygens probe. A Glenn-developed 32-GHz traveling wave tube with its power supply (amplifier), called a TWTA, is aboard to help researchers measure distances more accurately in space expecially for radio science and gravitational wave experiments conducted while Cassini orbits Saturn. The mission, managed by NASA's Jet Propulsion Laboratory, marks the first time a space probe attempts to land on the moon of another planet, providing vital data on the Earth-like atmosphere of Titan to more than 250 scientists worldwide.

For more information, visit www. grc.nasa. gov/WWW/PAO/history.html/history.◆

Behind the Badge

a closer look at our colleagues

Donna Herbster

Job Assignment: Avionics Lab manager in the Metals Technologies Branch of the Engineering Development Division

Time at NASA: Too many—27 years

Describe your family: My father is deceased. My family consists of my mother and two brothers.

Dream job: Full-time licensed minister

Most embarrassing moment: When I was an apprentice and blew out all the fuses in the building with a drill motor.

Hobbies/interests outside of NASA: I enjoy watching science fiction TV and movies and camping. I have been an auxiliary police officer for Cleveland for 9 years, currently holding the title of police auxiliary commander for base A–14. I am pursuing a degree in theology and have currently been "called" to serve as a pulpit supply minister for the United Church of Christ. Pulpit supply ministers fill in for ordained ministers as needed.

Food temptations: Chocolate and cheese

Stress buster: Go camping for a week.

Favorite Web site: *The Bible Unbound* because it's a quick reference source for my theological studies and for preparing sermons.

In Memory

John McAulay, 77, who retired in 1982 with 34 years of NASA service, recently died. He was a project manager for air-breathing engine research and worked on the Centaur.

John Morley, 61, who began his NASA career in 1963, recently died. He retired in 1995 as a supervisory voucher examiner.

George Seikel, 70, who retired in 1981 with 25 years of NASA service, recently died. He served as chief of the Plasma Physics Branch and managed the MHD Project for which he received NASA's Outstanding Achievement Award. The recipient of several NASA Group Acheivement Awards and member of AIAA, Seikel is listed in *Who's Who in the World and American Encyclopedia of Scientists and Engineers.*

Frederic Stickney, 87, who retired in 1976 with 13 years of NASA service, recently died. He was chief of procurement.

Contact the *AeroSpace Frontiers* at 216–433–2888 to place an "In Memory" item for a civil servant employee in the newsletter.

Supersonic inlet tests show promise

Glenn news release

Glenn recently completed testing on an advanced high-speed inlet for propulsion systems to power air transport vehicles at supersonic speeds.

"Compared to typical inlets in this operating range, tests showed high pressure recovery, low cowl drag, reduced complexity, increased safety, significant manufacturing cost reduction and weight, as well as increased efficiency," said David Lam, Aeropropulsion Projects Office.

Seeking potential applications to supersonic cruise vehicles, NASA has vigorously pursued an alternative to previously used inlet designs.

Prior to this latest testing, nearly 75 hours of testing the inlet late last year confirmed the advantages of the Parametric Inlet. Unlike typical inlets for supersonic cruise that rely on a mix of external and internal compression, this inlet accomplishes all of the supersonic compression externally. Comparable performance to typical inlets was shown to be possible, with the added benefits of relatively low weight and the elimination of unstart, which is a recurring problem in propulsion systems with mixed compression inlets.

Unstart occurs in mixed compression supersonic inlets due to the mismatch between the inlet air supply flow and the engine required flow, resulting in shock waves that are violently expelled from the engine. This often results in compressor stall combustor blowout and large increases in drag, which in turn decreases efficiency. Additional aircraft structure and larger control surfaces are necessary to compensate for the possibility of inlet unstart.

"NASA's tests of its Parametric Inlet have proven that this type of inlet can operate safely in the flow regime normally reserved for mixed compression inlets," said Dave Davis, Inlet Branch.

Four years ago, Boeing Aircraft, Seattle, WA, and TechLand Research, Inc., North Olmsted, OH, which received NASA funding through NASA's Small Business Innovation Research (SBIR) program, jointly conceived conceptual design of the Parametric Inlet. The inlet came to be known as the Parametric Inlet due to the wide range of geometric variables designed into it. After competing the three phases of the SBIR process in designing the inlet, Glenn took the lead in refining the aerodynamic lines and mechanical design, with help from TechLand. NASA's Vehicle Systems Program funded testing of the Parametric Inlet. Additional funding for testing was provided by the U.S. Air Force. ◆

C-2004-378

Pictured is a Parametric Inlet ready for testing in Glenn's 10-by-10-Foot Supersonic Wind Tunnel.

National Aeronautics and Space Administration

John H. Glenn Research Center
Lewis Field
21000 Brookpark Road
Cleveland, Ohio 44135

Volume 6 Issue 7 July 2004

NASA Glenn Research Center
AeroSpace Frontiers

AeroSpace Frontiers is recyclable!